

FIG. 1

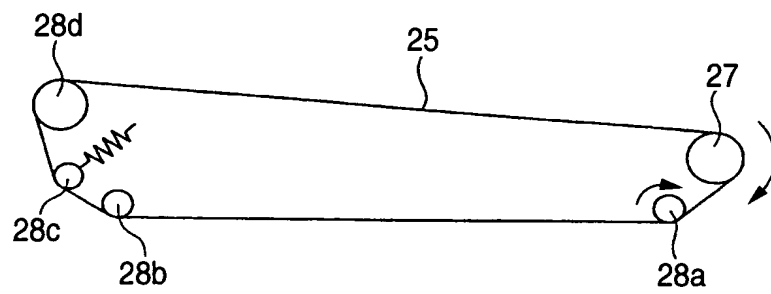


FIG. 2

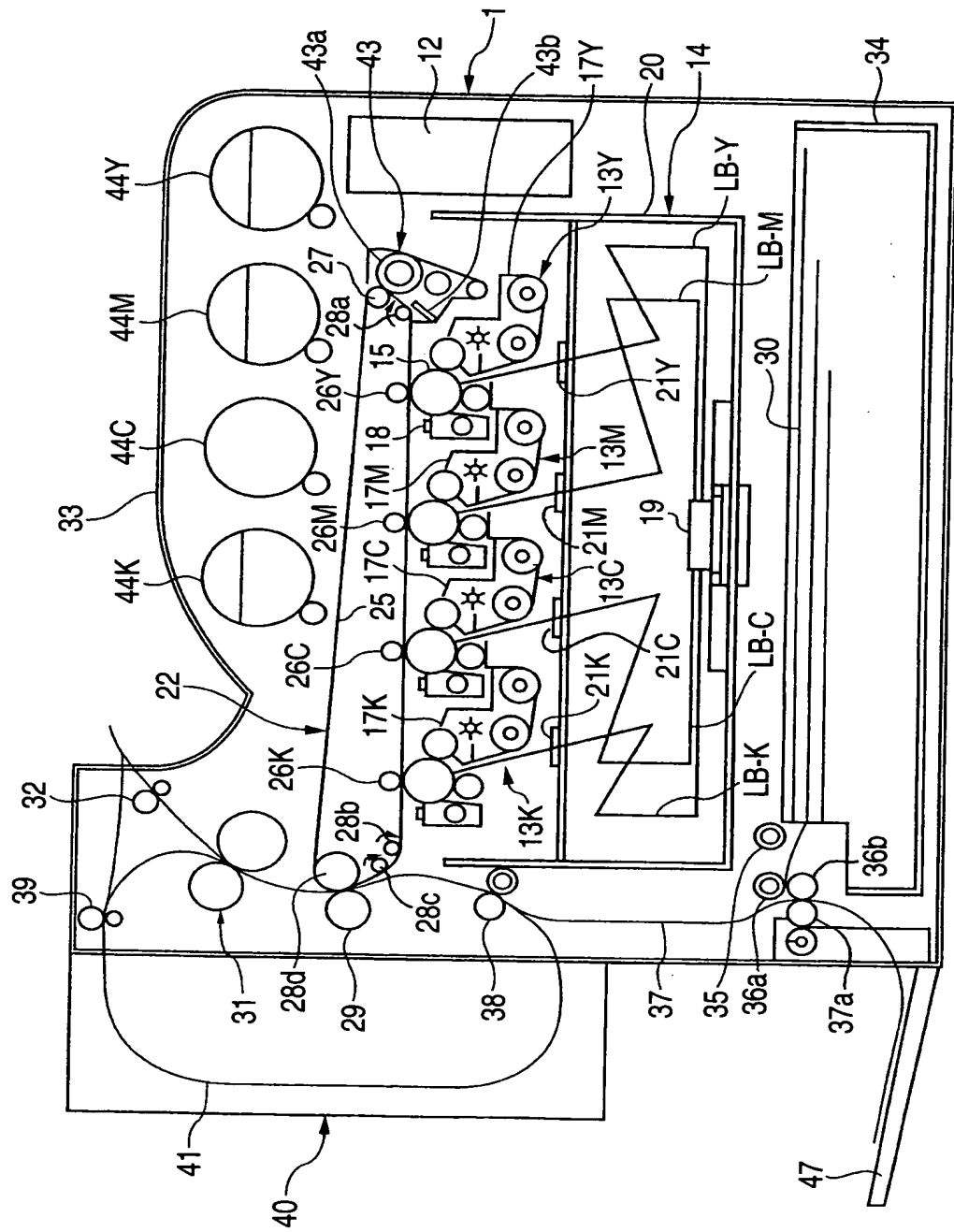


FIG. 3

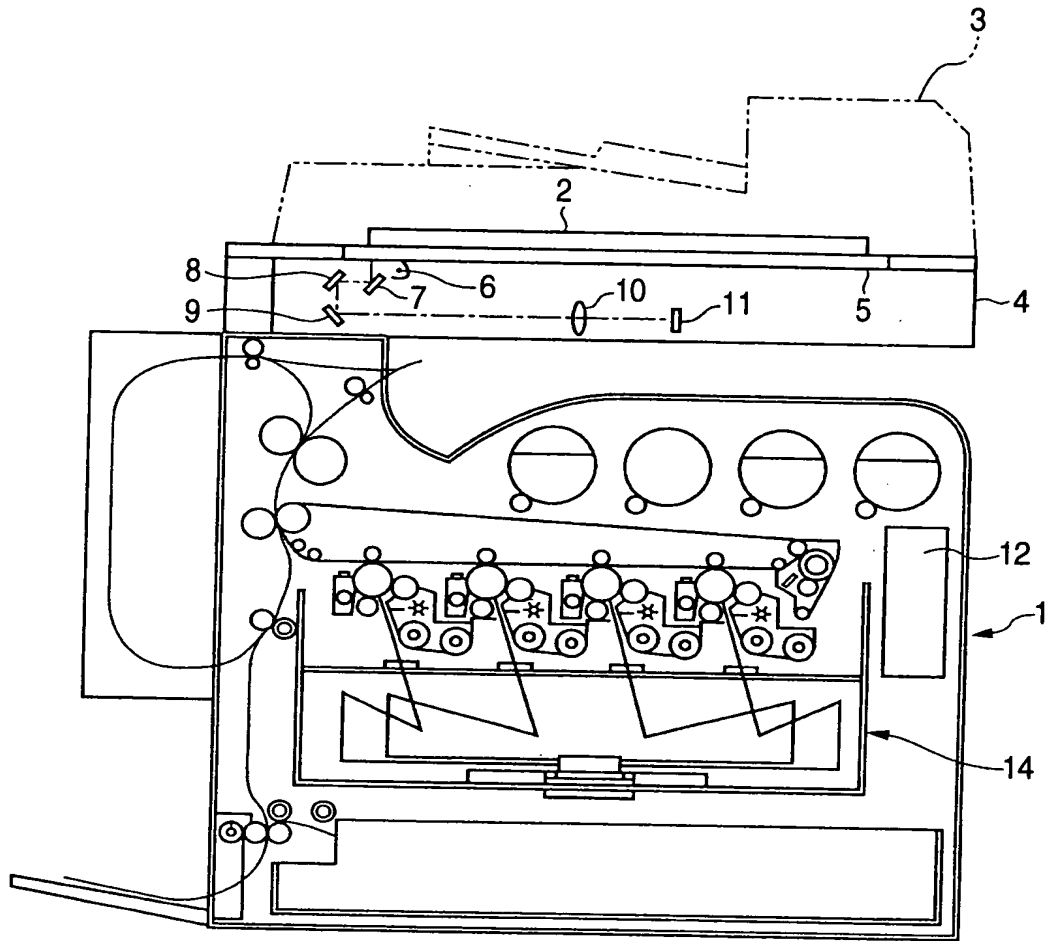


FIG. 4

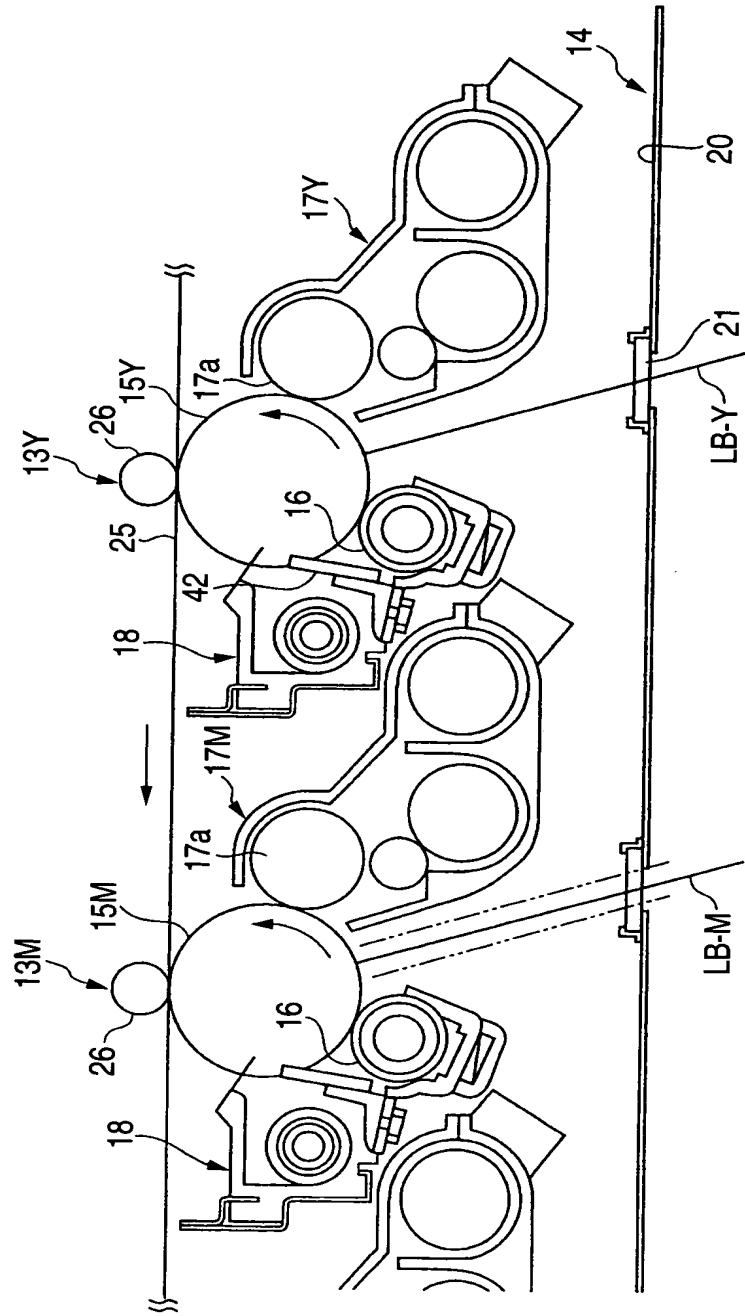


FIG. 5

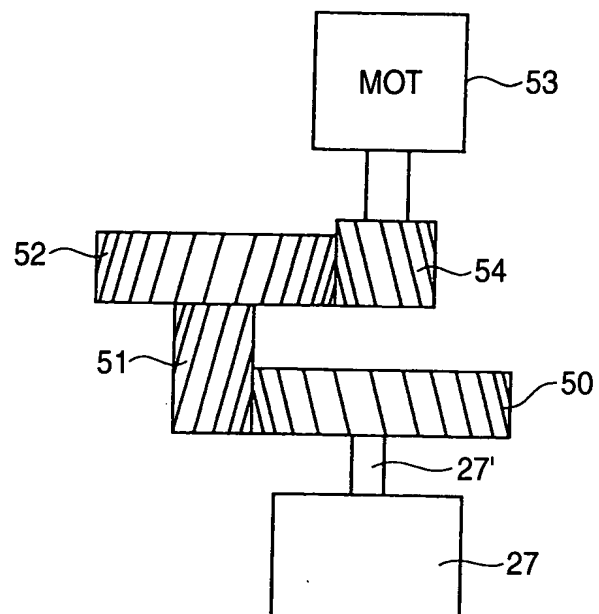


FIG. 6

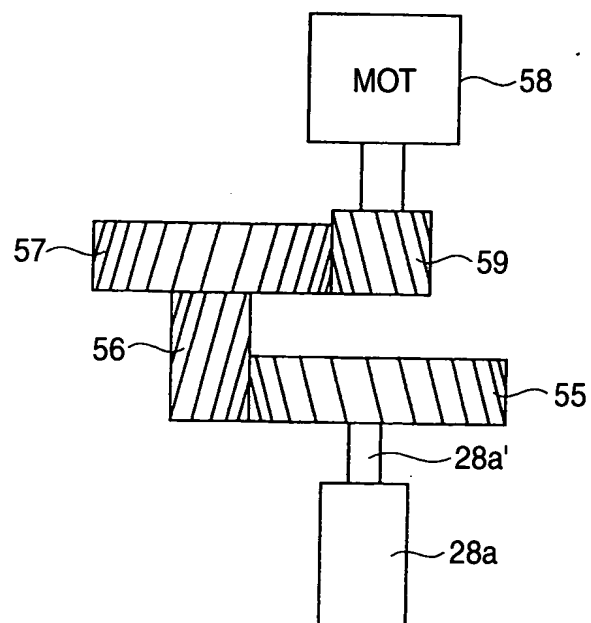


FIG. 7

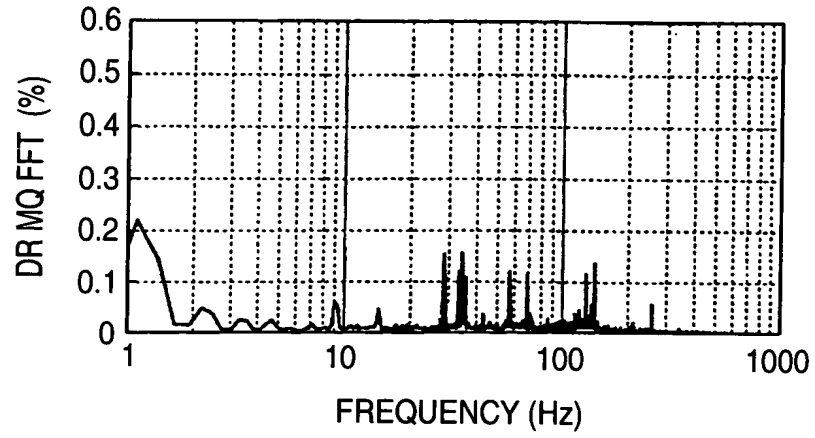


FIG. 8

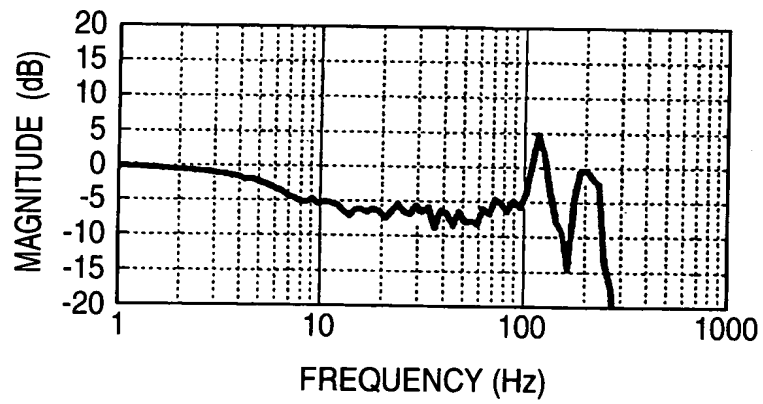


FIG. 9

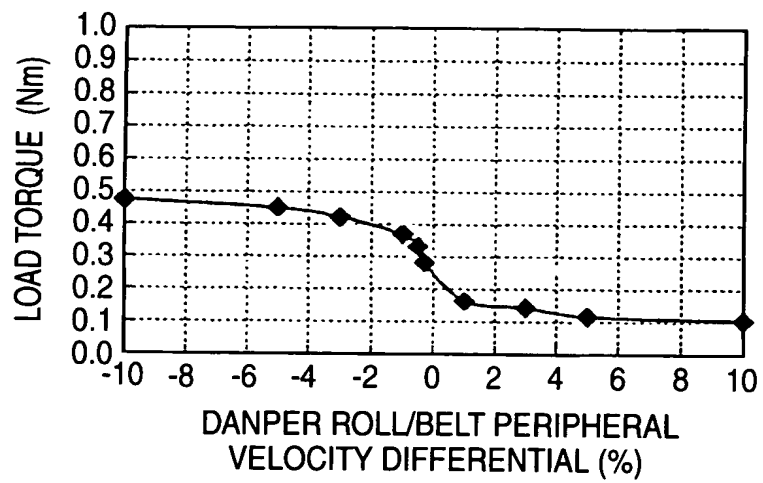


FIG. 10

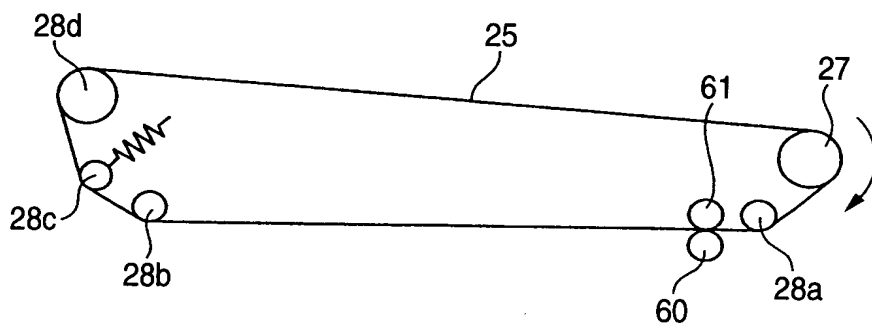
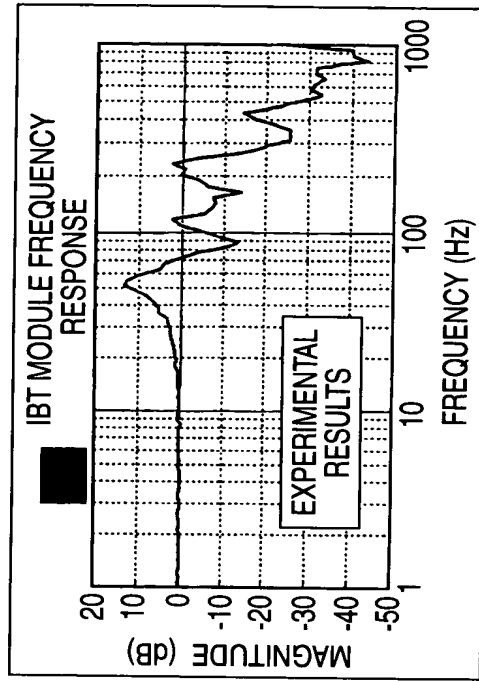
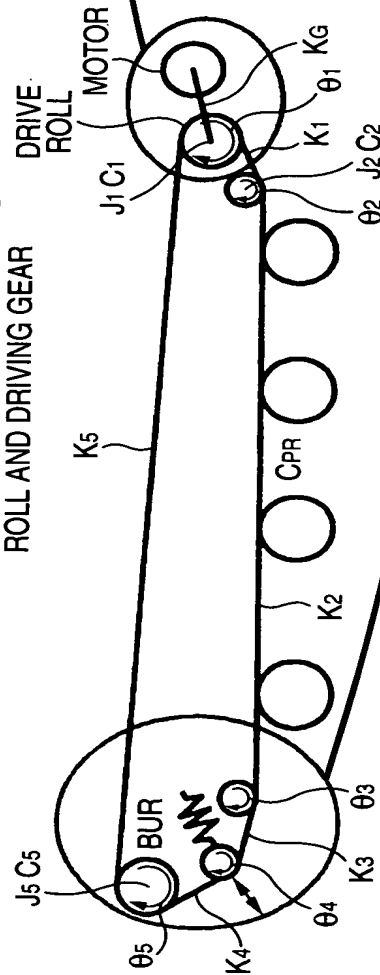


FIG. 11

$$\begin{aligned}
 J_1 \ddot{\theta}_1 &= K_G(\theta_0 - \theta_1) - K_1(r_1\dot{\theta}_1 - r_2\dot{\theta}_2)r_1 - K_5(r_1\dot{\theta}_1 - r_5\dot{\theta}_5)r_1 - C_1\dot{\theta}_1 \\
 J_2 \ddot{\theta}_2 &= K_1(r_1\dot{\theta}_1 - r_2\dot{\theta}_2)r_2 - K_2(r_2\dot{\theta}_2 - r_3\dot{\theta}_3)r_2 - C_2\dot{\theta}_2 - C_{PR}(r_2\dot{\theta}_2 - r_3\dot{\theta}_3) \\
 J_3 \ddot{\theta}_3 &= K_2(r_2\dot{\theta}_2 - r_3\dot{\theta}_3)r_3 - K_3(r_3\dot{\theta}_3 - r_4\dot{\theta}_4)r_3 - C_3\dot{\theta}_3 - C_{PR}(r_3\dot{\theta}_3 - r_4\dot{\theta}_4) \\
 J_4 \ddot{\theta}_4 &= K_3(r_3\dot{\theta}_3 - r_4\dot{\theta}_4)r_4 - K_4(r_4\dot{\theta}_4 - r_5\dot{\theta}_5)r_4 - C_4\dot{\theta}_4 \\
 J_5 \ddot{\theta}_5 &= K_4(r_4\dot{\theta}_4 - r_5\dot{\theta}_5)r_5 - K_5(r_5\dot{\theta}_5 - r_1\dot{\theta}_1)r_5 - C_5\dot{\theta}_5
 \end{aligned}$$



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BACKUP ROLL AND TENSION ROLL AND
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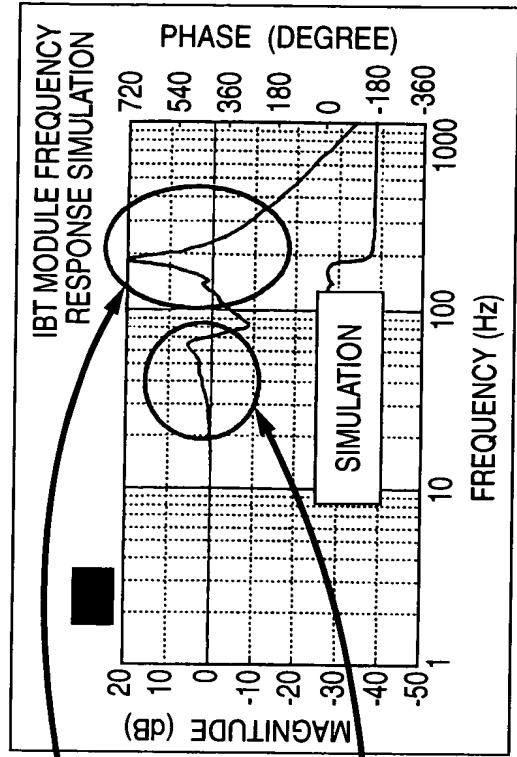


FIG. 12

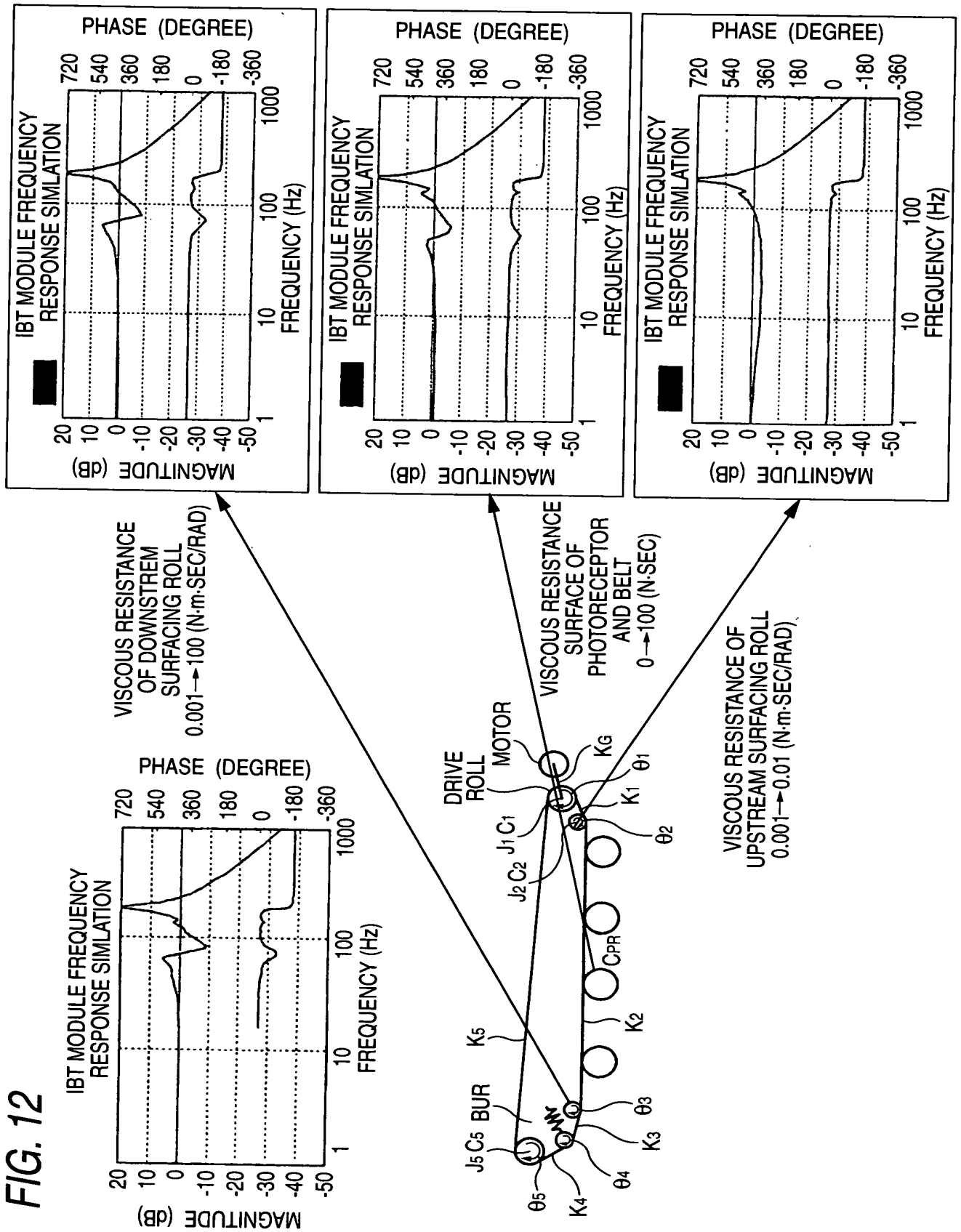


FIG. 13

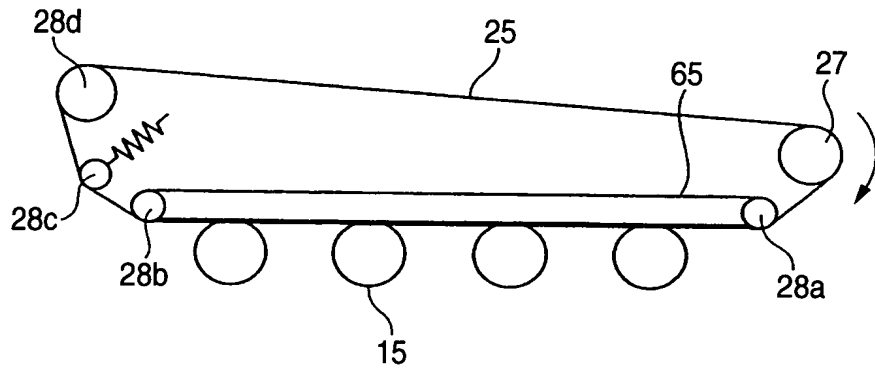


FIG. 14

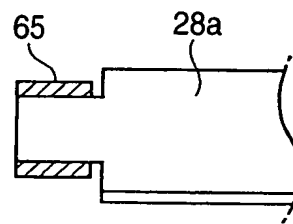


FIG. 15

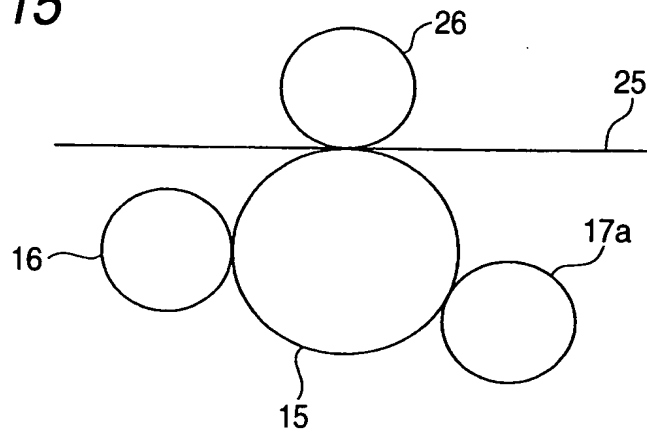


FIG. 16

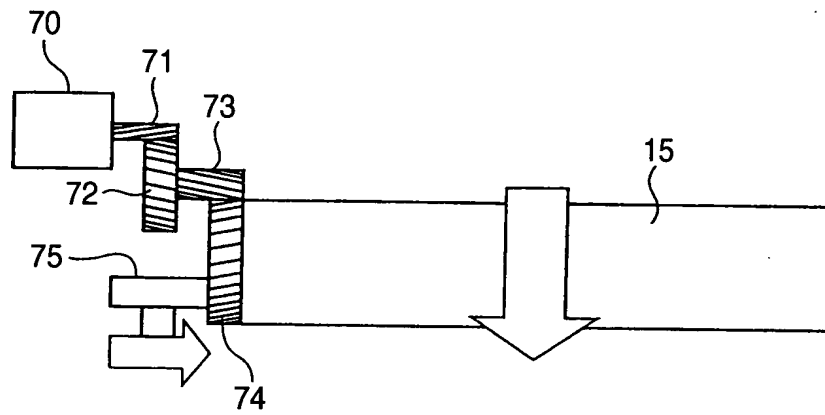


FIG. 17

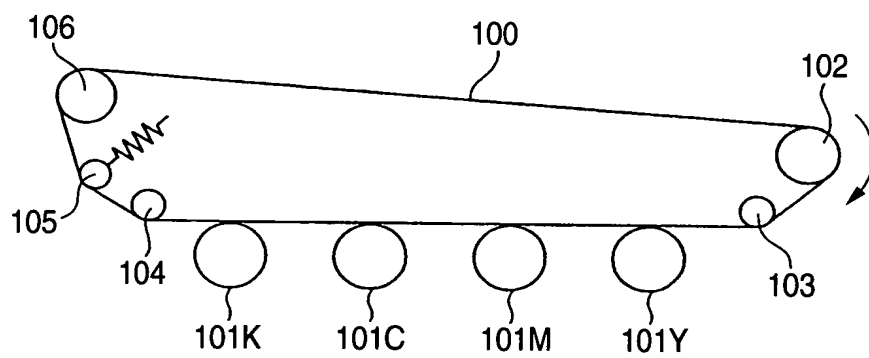
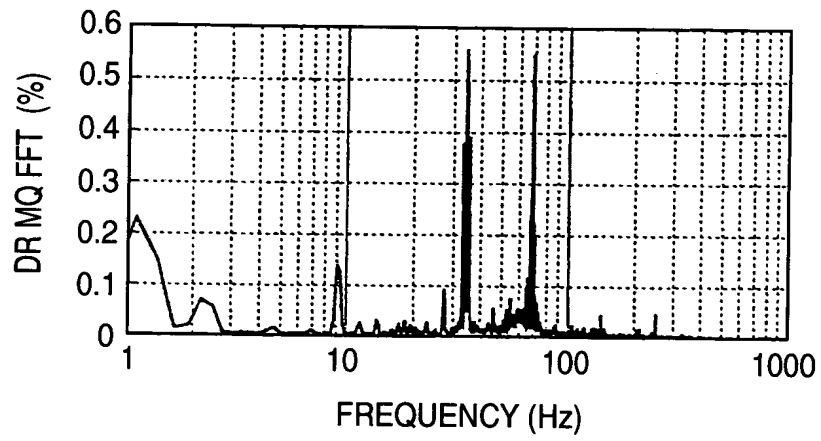


FIG. 18*FIG. 19*